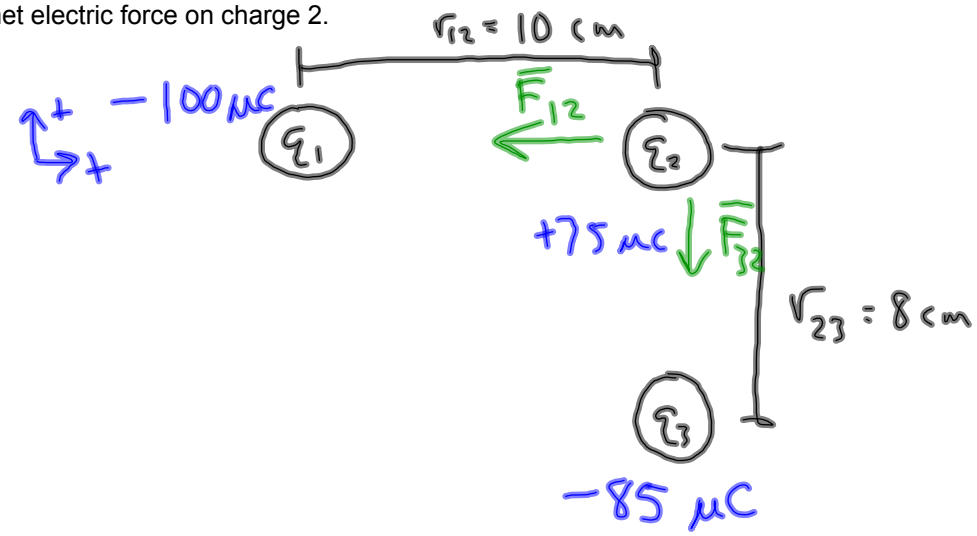
Electrostatics Practice Problems and Notes 4th Block 11.9.11

Three charges are arranged in a right triangle. Charge 1 has a value of -100 microC, charge 2 has a value of +75 microC, and charge 3 has a value of -85 microC. Find the net electric force on charge 2.



$$\Sigma \bar{F}_x = -\bar{F}_{12x} + \bar{F}_{32x}$$

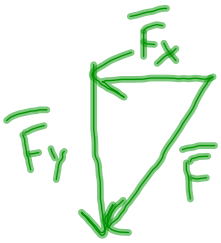
$$= -\frac{k|q_1||q_2|}{r_{12}^2}$$

$$= -6742.5\ N$$

$$\Sigma \bar{F}_y = \bar{F}_{12y} + -\bar{F}_{32y}$$

$$= -\frac{k|q_3||q_2|}{r_{32}^2}$$

$$= -8955\ N$$

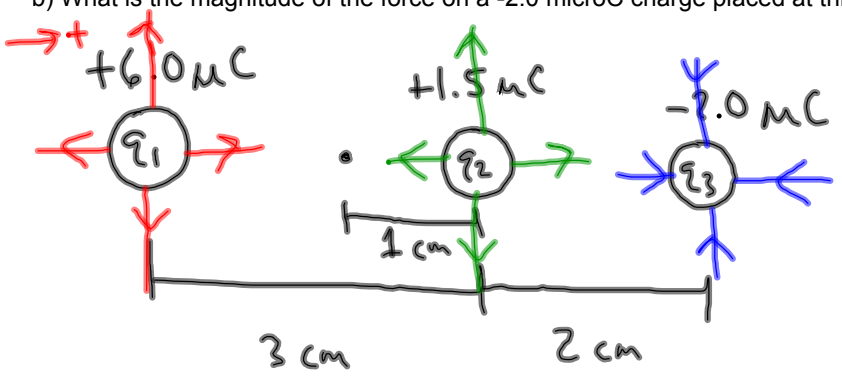


$F = 11209\ N$

$\theta = 53°$

S of W

Consider three charges arranged below.
a) What is the electric field strength at a point 1.0 cm to the left of the middle charge?
b) What is the magnitude of the force on a -2.0 microC charge placed at this point?



a) $\Sigma \vec{E}_{net} = {}^{+}\vec{E}_1 + {}^{-}\vec{E}_2 + {}^{+}\vec{E}_3$

$$= \frac{k|q_1|}{r_1^2} - \frac{k|q_2|}{r_2^2} + \frac{k|q_3|}{r_3^2}$$

$N \cdot m^2/C^2$

$$= k\left[\frac{(1E{-}6\,C)}{(.02\,m)^2} - \frac{(1.5E{-}6\,C)}{(.01\,m)^2} + \frac{(2.0E{-}6\,C)}{(.03\,m)^2}\right]$$

$$= 1.997E7\ N/C$$

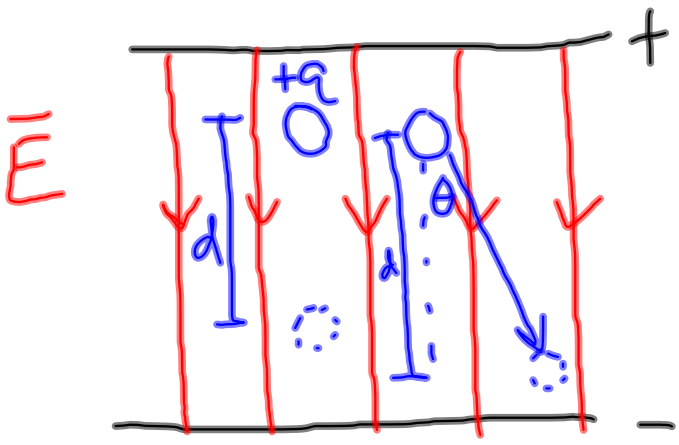
b) $\vec{E} = \frac{\vec{F}}{|q|}$

$$\vec{F} = |q|\vec{E}$$

$$= (2E{-}6\,C)(1.997E7\ N/C)$$

$$= 39.9\ N$$

• Electric Potential Energy



$$\Delta U_e = -qEd$$
$$= -qE\Delta d$$

• Electric potential difference

(electric potential, potential, voltage)

$$\Delta V = \frac{\Delta U_e}{q} = \frac{-qEd}{q} = -Ed$$

↳ eletric potential difference

Unit: $1\ V = 1\ J/C$

Volts